MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2018/2019

PPC0116 – PRE-CALCULUS

(All Sections / Groups)

19 OCTOBER 2018
3.00 p.m. – 5.00 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This examination paper consists of **3 printed pages** (including the cover page) with **4 questions only**.

2. Each question is worth **25 marks. Attempt ALL questions.**

3. Please write all your answers in the Answer Booklet provided. **Show all relevant steps** to obtain maximum marks.

Question 1 (25 marks)

(a) Express the following complex numbers in standard form (a + bi):

(i) $\dfrac{\sqrt{50}+\sqrt{-2}}{3-i}$. [5 marks]

(ii) $\dfrac{-17+2i}{3i^{17}}-6i^{7}$. [5 marks]

(b) Solve the following equations and inequality:

(i) $\left[(2x+1)^2-10x\right]^{\frac{3}{5}}=1$. [4 marks]

(ii) $\dfrac{2-x}{\sqrt{x^2+4x+4}}=\dfrac{5}{3}$. [6 marks]

(iii) $\dfrac{x+2}{x+3}\le 1$. [5 marks]

Question 2 (25 marks)

(a) Given a line L1 passes through $(-6,4)$ and $(1,-5)$. Find the equation of a line L2 that passes through $(-4,2)$ and is parallel to the line L1. [4 marks]

(b) Given a function $f(x)-(x^2+4x+4)(x^2-8x+16)$:

(i) Determine the end behaviour of the graph of $f(x)$. [1 mark]

(ii) Find the x- and y- intercept(s), if any. [4 marks]

(iii) State whether the graph crosses or touches the x-axis. [2 marks]

(iv) Determine the maximum number of turning point. [1 mark]

(v) Sketch the graph of f. [3 marks]

(c) Solve the following equations:

(i) $20e^{-0.25t}=11$ [3 marks]

(ii) $4^{x-3}=7^{2x+1}$ [4 marks]

(iii) $\log_3(2x+1)-\log_x x^2=\log_4 16$ [3 marks]

Continued....

Question 3 (25 marks)

(a) Given a function $f(x) = -2x^5 + 6x^4 + 10x^3 - 6x^2 - 9x + 4$, use synthetic division to determine whether $x - 4$ is a factor of $f(x)$. Then, use the Factor Theorem to verify that $x - 4$ is indeed one of the factors for $f(x)$. [6 marks]

(b) Use long division to find the remainder when $4x^4 - 5x^3 + 3x^2 - 5$ is divided by $x + 3$. Verify your answer using the Remainder Theorem. [7 marks]

(c) Given the rational function

$$f(x) = \frac{x^3 - 2x^2 + 2}{x^2 + 3x + 2},$$

use long division followed by partial fraction decomposition to show that $f(x)$ can be written in the form

$$f(x) = x - 5 - \frac{1}{x+1} + \frac{14}{x+2}.$$

[12 marks]

Question 4 (25 marks)

(a) Consider the arithmetic series

$$2 + 5 + 8 + \ldots + x = 345,$$

where x is a positive integer. Find the value of x. [5 marks]

(b) Find the tenth term a_{10} of the arithmetic progression a_n if $a_1 + a_2 = -2$ and $a_2 + a_3 = 6$. [6 marks]

(c) A company made a profit of RM 80,000 in 2017 and the company predicts that the profits will increase year by year in a geometric sequence with common ratio $r > 1$.

(i) Show the expression for the predicted profit n year after 2017. [1 mark]

(ii) Let n be the number of years it takes for the profit to exceed RM 400,000. Show that $n > \frac{\log 5}{\log r} + 1$. [4 marks]

(ii) Using $r = 1.08$, find the year in which the profit will exceed RM 400,000 for the first time. [2 marks]

(d) Find the first **FIVE** terms of the binomial expansion of $(3 + 2x)^{10}$. Write your answer in ascending power of x. [7 marks]

End of Paper